REMARKS

Applicant has carefully studied the outstanding Office Action. The present amendment is intended to place the application in condition for allowance and is believed to overcome all of the objections and rejections of the outstanding Office Action. Favorable reconsideration and allowance of the application are respectfully requested.

Applicant has amended claims 3 – 8, 10 – 14, 16 – 18, 21, 23 – 27, 29 – 32, 34 – 36, 38 – 41, 43 – 53, 55 – 60, 62 – 66, 68 – 70, 75 and 77 - 80 to more properly claim Applicant's invention. No new matter has been added. Claims 1, 3 – 14, 16 – 27, 29 – 36, 38 - 53, 55 – 66 and 68 - 80 are presented for examination.

In Paragraph 3 of the Office Action, claims 1, 3 – 14, 16 – 27, 29 – 36, 38 - 53, 55 – 66 and 68 - 80 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Mast, U.S. Patent No. 5,881,287 ("Mast") in view of Dwin et al., U.S. Patent No. 5,986,676 ("Dwin").

Distinctions between Claimed Invention and U.S. Patent No. 5,881,287 to Mast in view of U.S. Patent No. 5,986,676 to Dwin

The claimed invention concerns copy protection of image data that is rendered on a video display device. Such image data can be easily copied by a PrntScrn operation, or another such operation that captures data from a video RAM. The claimed invention intervenes with such operations by modifying captured data so that proprietary image data is replaced with substitute image data, before the captured data reaches it destination.

Mast concerns a method and apparatus for preventing copying of images from a video adapter memory. Image data rendered on a display device must first be loaded into video adapter memory. Even if the image data is protected by encryption while stored in a computer file, the data must be decrypted and loaded into video adapter memory in order for it to be rendered, which makes such data vulnerable to unauthorized copying. Mast overcomes the vulnerability of being able to copy proprietary image data from video adapter memory, by (i) injecting hooks into operating systems graphics display functions, (ii) identifying portions of the display data that contain proprietary image data, and (iii) blocking the identified portions from being transferred to memory. (Mast / col. 1, line 62 – col. 2, line 2; col. 3, lines 38 – 49; col. 8, lines 18 – 23)

Unlike Mast, which involves preventing capture of proprietary image data by hooking calls to Windows API functions, the claimed invention operates directly on data being transferred in and out of video adapter memory (present specification / element **405** of **FIG. 4**), without patching Windows API functions. Specifically, pages 11 and 12 of the original specification disclose vulnerabilities of protecting proprietary image data at the API layer by a system such as that of Mast, by (i) circumventing the Windows API functions, for example, using DirectDraw graphics methods, remote access programs and frame grabbers; or (ii) disabling patched API functions – for example, by intercepting the Windows API SetWindowsHookEx function, or be turning off message loops. The claimed invention overcomes the vulnerability of being able to circumvent patched API functions and thereby being able to copy image data from video adapter memory, by (i) marking pixel data that is transferred into a video adapter memory by subtly modifying the data (original specification / element **550** of **FIG. 5**), and (ii) modifying marked pixel data that is transferred out of the video adapter memory (original specification / element **570** of **FIG. 5**).

Mast does not describe modifying pixel data that is being transferred into a video adapter memory. In **FIG. 8** of Mast it is apparent that pixel data in the video adapter memory, as displayed in window **800A**, is unmodified. Mast only modifies pixel data transferred out of a video memory, as indicated in **FIG. 8** by the modification from window **800A** to window **800C**.

Dwin describes a device for protecting pixel locations on a display screen containing graphics data from being overlaid with video that is being displayed via a frame buffer (Dwin / col. 2, lines 1 – 9). A sample application is a full-screen television program being displayed on a PC, with an overlaid graphics clock that is updated once per minute. Even though the video information is being refreshed at a rapid rate, the protected clock information is not overwritten (Dwin / col. 2, lines 30 – 32; col. 9, lines 38 - 54). Dwin describes a memory (Dwin / element **18** of **FIG. 1**) that stores a frame buffer section and a lock buffer section, where the frame buffer section includes a full screen of data to be displayed, and the lock buffer section stores lock data which protects selected areas in the frame buffer section (Dwin / col. 3, lines 38 – 46; col. 7, lines 7 – 17; **FIG. 3**). As described in Dwin at col. 8, lines 50 – 57, " *... the lock data buffer is a contiguous array of pixels that has a correspondence to the pixels of the frame buffer, where the uppermost or left-most screen pixel is protected by the least significant bit of the data word at the*

address pointed to by the first address of the lock buffer ... the lowermost and the rightmost screen pixel is protected by the least significant bit of the data word that is pointed to by the last address of the lock buffer." The data words of the lock buffer thus provide a binary mask indicating a WRITE or NO-WRITE signal; i.e., whether or not a pixel location in the frame buffer should or should not have information written to it (Dwin / col. 2, lines 23 – 26; col. 7, lines 55 – 59).

Dwin does not describe modifying least significant bits of pixel data in a video frame buffer. Instead, as explained above, Dwin uses an auxiliary frame buffer, referred to in FIG. 3 of Dwin as a lock buffer, for storing a binary bitmap that serves to control a WRITE or NO-WRITE signal. It is clear from Dwin that, unlike the claimed invention, <u>the actual video data itself arriving from video processor **24** of **FIG 1**, and the graphics data arriving from graphics controller **16** of **FIG. 1** are not modified</u>.

The rejections of claims **1, 3 – 14, 16 – 27, 29 – 36, 38 - 53, 55 – 66** and **68 - 80** in Paragraph 3 of the Office Action will now be dealt with specifically.

As to amended independent method claim **1**, applicant respectfully submits that the limitations in claim **1** of:

"modifying least significant bits of stored pixel color data prior to its being received by the video RAM"; and

"recognizing individual pixel locations as having protected or unprotected pixel color datum, based on least significant bits of the pixel color datum, without comparison to a template of pixel locations",

are neither shown nor suggested in Mast or Dwin, taken individually or in combination.

In Paragraph 3.2 of the Office Action, the Office Action indicates that Dwin discloses a technique for protecting displayed information by modifying the least significant bit to generate control data. Applicant respectfully submits, as explained above, that <u>Dwin does not modify least significant bits of displayed information</u>. Instead, Dwin maintains a separate binary bitmap in a separate memory area, referred to as a lock buffer, in order to recognize which pixel locations of the displayed information have protected or unprotected data.

In Paragraph 3.2 of the Office Action, the Office Action cites Dwin, col. 7, lines 45 – 48, as disclosing that *"an alternative technique to storing the entire frame buffer image would be to store data representing only the information to be protected in the lock buffer."* Applicants' understanding of Dwin is that Dwin does

not actually store the pixel data to be displayed in the lock buffer. Instead, Dwin stores related data that indicates a WRITE/NO-WRITE signal, and what Dwin refers to at col. 7, lines 45 – 48 is that the related data need only correspond to a subset of the frame buffer where overlaying occurs. Thus, referring to **FIG. 3** of Dwin, the lock buffer section in the bottom half of the figure corresponds to a subset of the frame buffer section in the top half of the figure. That is, instead of storing a protection bit for each pixel in the frame buffer, it suffices to store protection bits for a subset of the frame buffer where overlaying occurs, such as the subset indicated in the bottom half of **FIG. 3**, since outside of the subset all protection bits would be off.

In order to further clarify the distinction between claim **1** and the prior art cited, Applicant has amended the term "pixel data" in the claim language to "pixel color data," to clearly distinguish between pixel protection data as in Dwin. Thus, referring to the language of claim **1**, in distinction to Dwin which recognizes individual pixel locations as having protected or unprotected pixel color data based on auxiliary pixel protection data, the claimed invention recognizes such pixel locations based on least significant bits of the pixel color data, without use of auxiliary data.

Because claims **3 - 13** depend from claim **1** and include additional features, applicant respectfully submits that claims **3 - 13** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **1** and **3 - 13** are respectfully submitted to be allowable.

As to amended independent system claim **14**, applicant respectfully submits that the limitations in claim **14** of:

"*a digital filter identifying protected pixel color data within the stored pixel data, and modifying least significant bits of stored pixel color data prior to its arrival at the video RAM on the first data bus*"; and

"*a pixel processor recognizing individual pixel locations as having protected or unprotected pixel color datum, based on values of least significant bits of the pixel color datum, without comparison to a template of pixel locations ...*",

are neither shown nor suggested in Mast or Dwin, taken individually or in combination.

Because claims **16 - 26** depend from claim **14** and include additional features, applicant respectfully submits that claims **16 - 26** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

In Paragraph 3.2 of the Office Action, the Office Action indicates that claim **14** recites the same limitation as the rejected claim **1** except for incorporating the claimed methods into a system. As above, applicants respectfully submit that Dwin does not modify least significant bits of displayed information.

Accordingly claims **14** and **16 - 26** are respectfully submitted to be allowable.

As to amended independent method claim **27**, applicant respectfully submits that the limitation in claim **27** of:

"modifying least significant bits of stored pixel color data prior to its being received by the video RAM, thereby generating modified pixel color data within which individual pixel locations are recognizable as having protected or unprotected pixel color datum, based on values of least significant bits of the pixel color datum, without comparison to a template of pixel locations",
is neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected method claim **1** apply to claim **27**.

Because claims **29 - 35** depend from claim **27** and include additional features, applicant respectfully submits that claims **29 - 35** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **27** and **29 - 35** are respectfully submitted to be allowable.

As to amended independent system claim **36**, applicant respectfully submits that the limitation in claim **36** of:

"a digital filter ... generating modified pixel color data within which individual pixel locations are recognizable as having protected or unprotected pixel color datum, based on values of least significant bits of the pixel color datum, without comparison to a template of pixel locations",
is neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected system claim **14** thus apply to claim **36**.

Because claims **38 - 44** depend from claim **36** and include additional features, applicant respectfully submits that claims **38 - 44** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **36** and **38 - 44** are respectfully submitted to be allowable.

As to amended independent method claim **45**, applicant respectfully submits that the limitations in claim **45** of:

"providing pixel color data within a video RAM, the pixel color data being marked such that individual pixel color datum is recognizable as being protected or unprotected"; and

"recognizing individual pixel locations as having protected or unprotected pixel color datum, based on values of least significant bits of the pixel color datum, without comparison to a template of pixel locations"

are neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected method claim **1** apply to claim **45**.

Because claims **46 - 49** depend from claim **45** and include additional features, applicant respectfully submits that claims **46 - 49** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **45 - 49** are respectfully submitted to be allowable.

As to amended independent system claim **50**, applicant respectfully submits that the limitations in claim **50** of:

"a video RAM storing pixel color data that is marked such that individual pixel color datum is recognizable as being protected or unprotected"; and

"a pixel processor recognizing individual pixel locations as having protected or unprotected pixel color datum, based on values of least significant bits of the pixel color datum, without comparison to a template of pixel locations ...",

are neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected system claim **14** apply to claim **27**.

Because claims **51** and **52** depend from claim **50** and include additional features, applicant respectfully submits that claims **51** and **52** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **50 - 52** are respectfully submitted to be allowable.

As to amended independent method claim **53**, applicant respectfully submits that the limitations in claim **53** of:

"*modifying least significant bits of protected pixel color data so as to mark it as being protected*", and

"*recognizing individual pixel locations as having pixel color datum that is marked as being protected, without comparison to a template of pixel locations*",

are neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected method claim **1** apply to claim **53**.

Because claims **55 - 65** depend from claim **53** and include additional features, applicant respectfully submits that claims **55 - 65** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **53** and **55 - 65** are respectfully submitted to be allowable.

As to amended independent system claim **66**, applicant respectfully submits that the limitations in claim **66** of:

"*a first pixel processor modifying least significant bits of protected pixel color data so as to mark it as being protected*", and

"*a second pixel processor recognizing individual pixel locations as having pixel color datum that is marked as being protected, without comparison to a template of pixel locations ...*"

are neither shown nor suggested in Mast or Dwin, taken individually or in combination. Applicants' arguments above with respect to rejected system claim **14** apply to claim **66**.

Because claims **68 - 80** depend from claim **66** and include additional features, applicant respectfully submits that claims **68 - 80** are not anticipated or rendered obvious by Mast, Dwin, or a combination of Mast and Dwin.

Accordingly claims **66** and **68 – 80** are respectfully submitted to be allowable.

For at least the foregoing reasons, applicant respectfully submits that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

CONCLUSION

If the Examiner believes that a conference would be of value in expediting the prosecution of this application, the Examiner is cordially invited to telephone the undersigned counsel at (650) 838-4300 to arrange for such a conference.

No fees are believed to be due beyond those noted in the included transmittal letter, however, the Commissioner is authorized to charge any underpayment in fees to Deposit Account No. 50-2207, including any funds necessitated due to a check being drawn on an account with insufficient funds. To the extent necessary and not otherwise requested, Applicant requests an Extension of Time to respond to the Office Action, and requests that the fee for such an extension be charged to Deposit Account number 50-2207.

Respectfully submitted,
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